City of Carnation

Wastewater Treatment Plant
Siting Process Summary Memorandum

Presented to the
Carnation Wastewater Treatment Plant
Citizens Advisory Committee
July 9, 2003

King County

July 2003

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I. INTRODUCTION

The City of Carnation has determined that replacing individual septic tanks with a wastewater treatment plant is an important step toward the long-term viability of the city. The City has contracted with King County to design, build, and operate the treatment plant. The County and City are now working together to identify potential sites for the plant and the best location for discharge of treated effluent.

The goal of the siting process is to identify wastewater treatment system alternatives. Each system alternative will consist of three elements:

1) a treatment plant site,
2) highly-treated wastewater (effluent) conveyance system, and
3) an effluent discharge site, either upland discharge or river discharge.

The project team will evaluate the wastewater treatment system alternatives in more detail in the Environmental Impact Statement (EIS). Engineering evaluations of the system alternatives will be completed in support of the EIS document, along with scientific and regulatory evaluations.

II. OVERVIEW OF THE SITING PROCESS

The siting process that will result in a selected system alternative is illustrated in Figure 1, Siting Process. As illustrated, each step results in a narrowing of candidate sites to arrive at an alternative that best meets the needs of the environment, the community, the City, and the County.

A. Screening Elements

The screening process includes three steps:

- Identify the planning area and candidate sites within the planning area
- Screen sites using desirable site characteristics according to site use (Coarse Screening.)
- Screen potentially acceptable sites using impact criteria (Fine Screening).

Establishing the Planning Area. At the beginning of the siting process, a planning area was established . The planning area is shown in Figure 2, Planning Area, and is based on a circle around the City of Carnation with a 2.5 mile radius and within which it is reasonable to locate wastewater treatment and effluent discharge facilities given the constraints of conveyance costs.

Identifying Candidate Sites Each component of a system alternative, the wastewater treatment plant site, the upland discharge sites, and river discharge sites must be located according to criteria that vary due to several factors. These factors constrained the available sites within the planning area:

- The County and City determined that the municipal wastewater treatment plant should be located within the City's Urban Growth Area (UGA).
- Candidate sites for upland discharge may be located outside the UGA but must have certain physical properties that allow infiltration to occur.
- Candidate sites for river discharge are limited by river channel stability, river flow and channel characteristics required for good mixing, total maximum daily pollutant load (TMDL) limitations, and potential for aquatic habitat impacts.

Coarse Screening Process. The purpose of the coarse screening process was to evaluate candidate sites and to identify potentially acceptable sites warranting further evaluation. "Coarse screening" criteria include size, topographic, hydrologic, environmental, and land use characteristics of desirable locations that are critical to successful siting. Coarse screening criteria are included in Appendix A.

Desirable site characteristics were used as initial "elimination criteria" which determined the first group of potentially acceptable sites. Sites were eliminated from further consideration based on a "pass/fail" database analysis, moderated by the engineering judgment.

GIS Techniques Used for Coarse Screening. The County's Geographical Information System (GIS) database and associated mapping were used for the initial site screening processes separately for the wastewater treatment plant sites and for the upland discharge sites. In addition to the above characteristics, the database provided other useful data:

- Site occupancy by type
- Parcel area in acres
- Soil characteristics by type

Additional resources were used to fill informational gaps:

- City and County zoning maps
- Washington State water well database

Fine Screening Process. "Fine screening" criteria were developed and modified based upon input from the Citizens Advisory Committee. The criteria were developed to facilitate evaluation and comparison of potential sites that passed the coarse screening. Fine screening criteria include questions in four categories: land use compatibility, geographic location, technical feasibility, and environmental impacts. Fine screening criteria are included in Appendix A.

Potential sites with relatively low probable impacts exhibit preferred characteristics and are more in line with siting goals than those with higher probable impacts.

The fine screening criteria were used to select recommended sites for both the wastewater treatment plant and for upland discharge.

Because of the limited number of suitable river discharge locations found within the Planning Area, the fine screening criteria were not developed or used to identify the best site for river discharge. The recommended river discharge site was identified by a study completed by Cosmopolitan Engineers as part of the siting effort. The summary report of that study is attached in Appendix D.

III. SITING ELEMENTS

Each element of the system alternatives has requirements and considerations that dictate the suitability of candidate sites. The methodology and evaluation considerations for arriving at the recommended wastewater treatment plant sites, the recommended upland discharge site, and the recommended river discharge site, are summarized below.

A. WWTP Site Screening Process and Recommendation

Desirable wastewater treatment plant site characteristics are those that will facilitate acquisition, permitting, construction, and long term operation of an WWTP. These desirable site characteristics have been translated into coarse screening criteria and include the following:

- Parcel size adequate for WWTP (approximately 5-acres.)
- Location outside of the floodway of Snoqualmie or Tolt Rivers
- Site elevation low enough for cost effective pumping of sewage or treated effluent (generally less than 300-feet elevation.)
- Slope flat enough for cost effective site development (generally less than 10%)
- Absence of significant wetlands areas on site.
- Consistency with County and City Urban Growth Area (UGA) requirements (WWTP in UGA.)

- Location outside of resource areas such as Agricultural or Forest Production Districts.

WWTP Study Area. The study area for siting the WWTP was limited to the City's Urban Growth Area (UGA) as defined City's Comprehensive Plan. The WWTP study area is shown in Figure 3, WWTP Study Area.

Key Steps in Coarse Screening include:

- GIS techniques to identify parcels meeting coarse screening criteria inside City's UGA.
- Manual check of parcels identified against characteristics
- Final check of "shortlist" of potential WWTP sites (15 sites)

A map depicting the results of the coarse screening is included in Appendix B.

Key Steps in Fine Screening. Key steps in the process to narrow the shortlist of sites included the following steps.

- Develop detailed fine screening evaluation criteria
- CAC review of fine screening criteria and modification of criteria in response to CAC comments
- Apply fine screening criteria to the 15 sites that remained after coarse screening
- Rating of potential site impacts using "red, yellow, green" symbols to indicate high, medium, low impact based on available GIS information.
- Windshield surveys of potential sites to assist in evaluating impact ranking for each question
- Summation of high, medium, and low impacts for each characteristic group.
- "Ranking" of sites based on sum of high and medium impacts by site (low "score" most acceptable site).

Results of Fine Screening. Fine screening criteria were applied to the fifteen wastewater treatment plant sites that passed the coarse screening. Eight of the fifteen sites were judged to have significantly higher impacts and therefore lower acceptability for location of a treatment plant. All eight sites had the highest impacts in the areas of land use compatibility, and acquisition costs. Four of the eight sites are occupied by schools, one is a park, one is a historic site, and two are occupied by urban residential uses which have size and required buffer restrictions. These eight sites did not survive the fine screening and were eliminated from further evaluation.

Seven sites remain following fine screening, and their relative acceptability is illustrated by Figure 4, Fine Screening Summary Chart.

As shown in Figure 4, two of the sites are clearly preferable based upon the application of the fine screening criteria. Figure 5 illustrates the location of these sites.

Recommended Wastewater Treatment Plant Sites. It is recommended that two sites, described in Figures 6 and 7, be carried forward for development of system alternatives. Key factors that led to recommendation of these wastewater treatment plant sites are summarized below.

- Alternative Site 1 - Site 35 - "Schaefer Site." The first recommended wastewater treatment plant site is the City-owned "Schaefer Site" located at the western end of Entwhistle Street, and northeast of McDonald Park. The advantages of this site are:
  - City-owned site. No acquisition costs
  - Properly zoned; Light Industrial/ Manufacturing. Simple permit process
  - Low land use impact. Minimal impact on pedestrian circulation or recreational uses.
  - Close to infrastructure: Within 1/2 mile of the proposed sewer system and within 1-1/2 miles of the potential river discharge

site. Close to electrical, water and other city services.

- Low traffic and land use impacts. Not adjacent to residences; near other City functions; adequate existing streets.
- Adequate technical character. Low to no-slope, adequate geology.
- Adequate environmental impact. In flood plain, but outside Shoreline Management zone; no know habitat impacts.

- Alternative Site 2 - Site 45 - Concrete Plant. The second recommended wastewater treatment plant site is an occupied industrial site just off Highway 203, near the fire station and middle school. The advantages of the site are:

  - Properly zoned; Light Industrial/ Manufacturing. Simple permit process
  - Low land use impact. No impact on pedestrian circulation or recreational uses.
  - Close to infrastructure: Within 1/2 mile of the proposed sewer system and within 2 miles of the proposed river discharge sites. Close to electrical, water and other city services. Within 1 -1/2 miles of the Upland Discharge area.
  - Low traffic and land use impacts. Not adjacent to residences; near other City functions; good existing streets.
  - Adequate technical character. Low to no-slope, adequate geology.
  - Adequate environmental impact. In flood plain, but outside Shoreline Management zone; no know habitat impacts.

B. Upland Discharge Site Screening Process and Recommendation

Desirable Upland Discharge site characteristics are those that will protect groundwater quality and protect the natural and built environment, facilitate acquisition, permitting, construction, and long term operation of the Upland Discharge area. These characteristics include:

- Parcel size adequate for Upland Discharge (about 10 acres.)
- Location outside floodway of Snoqualmie or Tolt Rivers
- Elevation of site low enough for cost effective transfer of sewage or treated effluent (generally less than 300-feet elevation.)
- Slope of site flat enough for cost effective site development (generally less than 10%)
- Absence of significant wetlands areas on site.
- Consistency with County and City Urban Growth Area (UGA) requirements (Upland Discharge site may be outside City's UGA.)
- Location outside resource areas such as Agricultural or Forest Production Districts.

Upland Discharge Study Area. The study area for siting the Upland Discharge site is limited to the area defined by the "Upland Disposal Alternatives, Technical Memorandum No. 5", prepared by Robinson Noble, attached in Appendix C. The study area is shown in Figure 8, Upland Discharge Study Area.

GIS techniques were used to identify geologic characteristics (soil, groundwater, wells) in the area amenable to upland discharge using infiltration techniques. The study area was defined by soils study.

Key Steps in Coarse Screening.

- GIS techniques used to identify parcels within the study area meeting Coarse Screening criteria.
- Manual check of parcels identified against characteristics
- Final check of "shortlist" of potential sites (7 Upland Discharge sites.)

A map depicting results is shown in Appendix B.

Key Steps in Fine Screening. Key steps in the process to narrow the shortlist of Upland Discharge sites included the following steps.

- Develop detailed fine screening criteria.
- Review of Fine Screening criteria by CAC and modification of criteria in response to CAC comments.
- Ranking of site impacts using "red, yellow, green" symbols to indicate high, medium, low impact based on available GIS information.
- Windshield surveys to assist in applying each criterion.
- Summation of high, medium, and low impacts for each characteristic group.
- "Ranking" of sites based on lowest sum of high and medium impacts by site.
- Selection of Fine Screening Shortlist (7 sites.)

Results of Fine Screening. Fine Screening criteria were applied to the seven sites that passed the Coarse Screening. Two of the seven sites were judged to have higher impacts because they are occupied by residences, and they were smaller and farther away from the main area of interest. Therefore, they had lower acceptability for location of a upland discharge site. These two sites were eliminated from further evaluation.

Five sites remain following the Fine Screening and their relative acceptability is illustrated by Figure 9, Fine Screen Summary. Figure 10, Upland Discharge Plant Sites, illustrates the location of these sites. Descriptions of all four sites are included in Appendix C.

Recommended Upland Discharge Area. The recommendation of the project team for Upland Discharge sites is to include all parcels in a single Upland Discharge site area for purposes of the EIS and further technical analyses for the following reasons:

- Soils suitability and site size for infiltration is dependent on site-specific soils and groundwater investigation. Currently available information does not distinguish among the sites.
- Acquisition costs and other non-technical factors cannot be adequately assessed at this time.

C. River Discharge Site Screening Process and Recommendation

A good River Discharge site should have the following characteristics:

- Location where water quality standards and TMDL limits can be met.
- Area where fish and other aquatic life can be protected.
- Location where there is a historically stable river channel.
- Location where there is acceptable water depth and velocity.
- Location where there are no moving gravel beds on the river banks.

River Discharge Study Area. The River Discharge study area was limited to the reaches of the Snoqualmie River within the Planning Area. It is illustrated in Figure 2, Planning Area Map. Three areas were defined by an examination of historical aerial photographs of the river to determine where channel location changes indicated transient gravel bed conditions.

Siting Process for River Discharge. The siting process for the river discharge is different from the WWTP and Upland Discharge processes. It is dependent on the desirable characteristics listed above. Cosmopolitan Engineers performed an evaluation of the Snoqualmie River within the Study Area using the following methodology:

- Define critical mixing zone parameters for the river based on the State water quality standards for this reach of the river.

- Determine river dilution factors from flow data using FEMA information.
- Determine river mixing zone dimensions from modeling.
- Apply Total Maximum Daily Load (TMDL) limitations to the river discharge locations.
- Identify impacts on WWTP processes to meet TMDL criteria at the sites identified.
- Select promising sites for further evaluation.

Results of River Discharge Siting Process. The River Discharge siting process identified three potential sites, shown in Figure 2. These three sites were then evaluated based on the following criteria:

- Adjacent land use characteristics, such as proximity to parks and public recreation use.
- Habitat conservation and enhancement project plans by City, County and nongovernmental organizations.
- Technical considerations such as conveyance routing to the site, permitting, and land acquisition.

As a result of applying these criteria, the site shown in Figure 11, River Discharge - Recommended Site, was selected for further evaluation and inclusion as part of a system alternative. The river discharge recommended study site is a Chinook Bend. The advantages of this site include:

- The outside (right) bank is armored with rip rap, increasing stability.
- The channel is relatively deeper, giving better mixing characteristics.
- The site is downriver (past) important salmon spawning habitat.

The site is described in excerpts from the consultant's report, included in Appendix D.

IV. GETTING FROM SITES TO ALTERNATIVES

Four system alternatives, each consisting of a recommended treatment plant site and a discharge site, are recommended for further evaluation during the EIS process. These system alternatives are displayed in Figures 12 through 15, Alternatives 1A through 2B. These system alternatives illustrate likely combinations of treatment plant sites and discharge locations with conceptual conveyance routes between them. Treatment plant processes and associated costs are in part dictated by the type of discharge (river or upland) and may differ for each discharge option. Treatment requirements and capabilities will be developed for each system alternative.

The conveyance routes are preliminary, and they will be refined first by the EIS scoping process, and during the development of the draft EIS to the level necessary for impact analysis. Following selection of an alternative, the conveyance route for the project will be further refined, taking into account permitting, requirements, costs, and design criteria.

V. NEXT STEPS

The next steps, listed above include:

Conduct Environmental Scoping. A public comment period and meeting will be held to gather public input on the environmental issues and alternatives that the EIS should cover. The County Executive will then select alternatives for detailed evaluation in the EIS.

Environmental Review. A Draft EIS will be prepared and issued for public comment. Public comments will be addressed in the Final EIS.

Selected Final Recommended Alternative. The Final EIS will be prepared and issued. The County Executive, in consultation with the City will make a final decision on a system alternative.